DOCUMENT RESUME

ED 188 255 CS 502 944

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TITLE Perspectives of Interfacing People with Technology in the Development of Office Automation.
PUB DATE May 80
NOTE 18p.; Paper presented at the Annual Meeting of the International Communication Association (Acapulco, Mexico, May 18-23, 1980).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Automation; *Change Strategies; Futures (of Society); *Office Machines; *Organizational Communication; *Organizations (Groups); Technological Advancement

ABSTRACT

Noting the increasing impact of office automation on the workings of both people and organizations, this paper purposes the need for implementation methodologies, termed "self-actualizing systems," to introduce automation technologies into the office environment with a minimum of trauma to workers. Such methodologies, it contends, allow users to become directly involved in the evolutionary development of the system from the outset through the process of planning, development, training, and developing equipment know how, so that they develop a full understanding of how the technology will be applied to their jobs. The paper concludes that as users become involved in the process they become an integral part in designing applications that fit their jobs. (FL)

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PERSPECTIVES OF INTERFACING PEOPLE WITH TECHNOLOGY IN THE DEVELOPMENT OF OFFICE AUTOMATION

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Paper presented to the
XXX ANNUAL CONFERENCE OF THE
INTERNATIONAL COMMUNICATION ASSOCIATION
HUMAN EVOLUTION AND DEVELOPMENT
May 22, 1980 - Acapulco, Mexico

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1.0 INTRODUCTION:

This ICA Conference takes place at a very significant time, a time when one of the major challenges facing companies in the United States and many countries is the need for increased office productivity. The changes resulting from the needs for increased productivity, sometimes identified as Office of the Future, during the eighties, will transform the office environment, and materially affect the nature of work within this changed environment. Subsequently, this will have a dramatic affect on all of us who work in the office, especially in the United States where the knowledge worker is fast becoming over 50% of the work force.

Probably the most interesting, and yet, the most disappointing aspect of the present surge in office automation, is the emphasis placed on productivity improvements of the typing function. Although word processing has lived up to most of its expectations, the main thrust of any office automation program should be the productivity improvement of the total office.

Many organizations have taken some steps along the road to office automation, but have been frustrated by poor results and adverse effects on office behavior. Growing awareness of these situations is causing concern among organizations which in turn are becoming increasingly cautious in their approaches to the subject. Control Data as a large (53,000 employees) international corporation has been actively pursuing the benefits of office automation for several years and is not removed from this concern. Our experience has been invaluable, because we now have first hand-knowledge in office automation, and are moving to develop a staff organization to support and coordinate corporate-wide development in this most vital area.

In this paper, I will give an overview of some of the experiences and changes that are taking place at Control Data--the benefit we expect to gain from these changes and some of the problems occasioned by them.

2.0 A HUMANISTIC APPROACH TO OFFICE AUTOMATION:

People work in offices, not machines. Increasing the effectiveness and efficiency of people in the office requires a broader, more flexible humanistic approach. First of all, a thorough understanding of the office as a complex system of relationships and roles is required. Secondly, the ability to interweave technology into these environments requires a careful implementation methodology that has as, its cornerstone, an understanding of human behavior.

The advent of office automation has been with us, in some form or another, for over a decade; and even longer if we will consider point to point or torn tape telegraph systems as early forerunners of "electronic mail." However, there was little significant impact on office procedures or environment by these early systems. In most cases, they were not visible in the office environment, but like the typing pool and the mail room, were located away from the user of these services. The challenges have really come from the introduction of these services placed directly into the center of the office environment. These services caused radical changes in the way office workers had to interface with them and highlights the importance of selecting those services that should be introduced.

Since there has been much interest all across industry in this subject, we are not alone in our studies. Distinguished researchers have done extensive work in office automation behavior include: Dr. Jacques Vallee, President, Infomedia; Dr. Tom Lodahl, Cornell University; Dr. Peter G. W. Keen, Sloan School, MIT; N. Dean Meyer, Diebold Group and James Bair of Bell Northern Research. Probably the most interesting parallel research, that of futuristic approaches to education, has been conducted by Dr. Arthur M Harkins of the University

of Minnesota. In both these areas the researchers are keying in on the effects on behavior associated with the introduction of these new technologies.

Corporate experience in systems implementation and its acceptance in the office.

One of the first Control Data departments where we attempted to introduce "Office of the Future" concepts was our "Traffic Department," which numbers about 70 to 80 people. This organization has the responsibility for the physical distribution and transportation of people, products, and supplies both internally and externally, domestic and international. This involves a high degree of paper handling and verbal and written communications. Their critical activities have a major impact on our company earnings.

Our first experiment in the Traffic Department was to test the feasibility of using a remote Word Processing Work Station in conjunction with with our keyword textual search data base management system. The result is a highly efficient and effective work station with word processing, text editing, distributed data processing, and messaging capabilities. The premise of this test was that the technology should be adapted to work needs. Further, that the trauma of change should be minimized and the secretarial/clerical role should remain essentially unchanged vis-a-vis the support to the manager. We also felt, technology should enhance the total secretarial/administrative support function of the office.

Early on, we recognized that improving the productivity of our managers and professionals would provide the greatest return on investment in office automation. We have realized part of this objective through leveraging the increased effectiveness of the office support functions. Direct gains in productivity by managers and professionals can be realized through their use of electronic messaging and computerized information filing and retrieval. Perhaps a more significant and yet subtle benefit

has been their increased awareness of office automation, by leading them to apply these technologies.

The objective was to determine the changes introduced by office automation and to make these changes an accepted part of the way people work. The implementation methodology used was developed to explicitly recognize the organizational, social, and psychological issues. Attention and resources were committed to transferring the "new operational" applications to the user organization.

The early test results of this experiment are illuminating and suggest strongly that the methodologies used in this experiment, to introduce office automation technologies, are likely to be successful. These implementation methodologies are significantly different from the standard accepted implementation techniques used in the computer industry. These methodologies will be explained later under the subject heading of "Self-Actualizing Systems: a new methodology for office automation implementation."

The test looked at the secretarial/clerical function as an originator, manager, communicator, scheduler, and administrator of information. Additionally, we have found that the secretarial/clerical support role is not well understood in its entirety; that the technology is not totally responsive to the needs; that principals, including the managers and professionals spend a great deal of their time in clerical tasks.

From this and other similar experiments, based on the fundamental belief that.....

> it is easier for the office worker
> to understand technology than it is
> for the analyst to understand
> what goes on in the office,

we should be able to develop a set of procedures to guide the office automation program.

We are firm believers that behavior is key to introducing new office technologies.

3.0 SELF-ACTUALIZING SYSTEMS: A NEW METHODOLOGY FOR OFFICE AUTOMATION IMPLEMENTATION:

Based on our preliminary experiments with the Traffic Department we have grouped our implementation methodologies, which "bridge" the needs of the user with the capability of these technologies, under the term "Self-Actualizing Systems." This term should convey to the user, their control of and responsibility for the design, development, and maintenance of useful and responsive functional applications.

This methodology differs from the typical systems analysis and other computer-based approaches, in that, throughout the various phases of development, the user is in control, both as a participant and as a change agent.

This process is a marked departure from the traditional method inasmuch as the user becomes directly involved in the evolutionary development of this unique system from the outset (Figure 1). The user will attain a full understanding of how the technologies will be applied to their individual jobs through the process of planning, development, training and developing equipment know-how. This differs from the standard "top-down" approach in that all users become involved throughout the entire introduction of automation into the office. As they become involved in this process each individual becomes an integral part in designing applications that fit their particular job function.

By taking the approach that "machines are extensions of people" rather than "people are extensions of machines", the user develops applications that bridge the gap.

In the past, technicians have designed systems that only they understand and can use. For years we have continually strived to develop "user friendly systems" - usually with the same results. When introduced to the office worker they do not

TRADITIONAL METHOD	SELF ACTUALIZATION METHOD
Define Requirement	Indoctrinate
Data Gathering	Train
Analysis	User System Development
Design	Use
System Build	User Enhancement
System Install	Further Development
System Test	Continuing
Training	
Accepted	
Use	

Figure 1

succeed, not because the system isn't good, but because of the normal resistance to change, compounded with the disregard for the human factor. The technology has always been there, it still is; and now, all we have to do is address this resource in a user oriented manner.

An example of good technology is the Wang Office Information system which doesn't use technocratic terms such as "compiler" and "operation system", but uses the easily understood terms, such as "menu" and "glossary." The system is easily learned, thus, the user quickly identifies with the system. After initial training and working through the development of an application the user is capable of accomplishing independent application enhancements and further development.

The humanistic approach to bridging the gap is a key factor, not only in the developmental phases of office automation, but also in this self-actualizing system process.

In order to ensure the success of this system, a "facilitator" is assigned the responsibility of working with the user organization's team leader. The facilitator's job description is summarized in the following statement:

> The introduction of any change requires a crusader to inform people of its worth, an interpreter to explain its use and operation, a confidant to build confidence and act as an advisor, and a teacher to provide personalized instruction.

It has been our experience that these expectations and associated frustrations encountered in many of the more traditionally developed systems are missing from humanized interactions. The catalyst for this improved process is the facilitator, a key member of the user team who is loaned from, in Control Data's case, our Corporate Information Exchange Services group. This group has representative skilled

personnel in most of the technologies associated with the Office of the Future including; Electronic Mail, Word Processing Systems, Management Productivity Measurement. Strong support is provided from other corporate resources, or external resources if that proves necessary.

The composition of this team, being so user oriented and facilitator led, unleashes many times the creative energy possible through previous traditional methods. Because of this new office technology it is far easier to aid the user in understanding the technology than it is for the analyst to understand the increasing complexity of the office environment.

We believe that in an environment of rapid change the development of systems using conventional traditional methods cause us to encounter the "Bermuda Triangle Effect" which literally translates into a new systems law: "The divergence between a delivered system application and user requirements increases proportionately to the length of time taken for the development of the system." (Figure 2)

An additional benefit of this high level of user involvement is that each user becomes an advocate in the attributes of office automation. Increased involvement by users increases the motivation of the knowledge workers supported by these new systems and thus contributes to increased productivity. New career paths become available for users who, as they become increasingly familiar with the new technologies, develop the potential for becoming the facilitators of tomorrow.

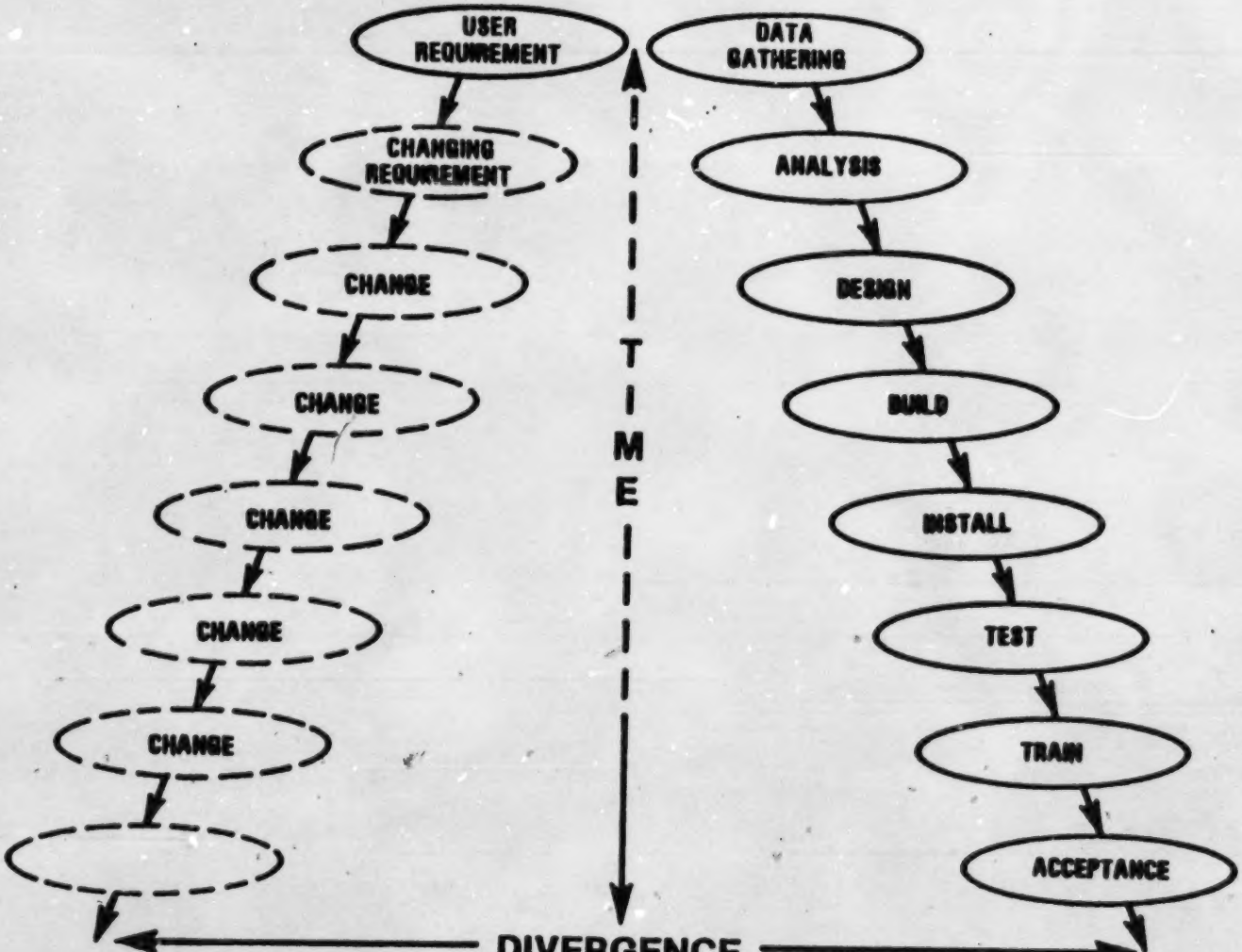
4.0 CONSIDERATIONS FOR THE FUTURE:

Much has been written about the projections of technological growth, and if the seventies are any indication of what we might expect in the eighties, we can readily believe that further development of the computer systems and technology will be both evolutionary and revolutionary. The "chip era" will continue on its fast track to "componentize processors" and memory systems to provide micro-miniturized machine hardware, with which we can build digital automation products, and distance-insensitive communication systems.

To quote Professor Arthur Harkins of the University of Minnesota, systems will be characterized as "ethnotronic", a word he coined from ethnic and electronic. Systems will increasingly be regarded as "appliances" for amplifying peoples capabilities. This will lead to a culture in which such appliances, possessing communications capabilities and computer intelligence, will communicate with other similar applicances and the people they serve.

This technologigal growth will likely have a high impact on information and knowledge based cultures such as those of the office - it could lead to offices as portable as the brief case. However, we do not need to wait for these "Buck Rogers - type" devices to start Office Automation programs. The technologies we have at hand today provide ample opportunity to greatly improve the productivity of the total office.

The changes associated with the introduction of new technologies into the office are far greater than office personnel have ever encountered. We are dealing here in an environment which not only contains a fairly complex set of relationships that are not well understood or structured, but ironically one that has been relatively stable for many decades. We are dealing a with well-developed office and information culture.



"THE BERMUDA TRIANGLE"

FIGURE 2

The issue is behavioral not technological. The challenge is to find a way to introduce office automation while minimizing the trauma of change. The systems introduced must be flexible and adaptable. The atmosphere one of excitement and challenge.

New implementation processes have to be developed which allow office automation systems to be created by the office worker so the systems will become self-teaching, self-designing, self-developing, and self-maintaining.

Office automation systems then can have perculiarily human like personalities. This isn't difficult to understand, after all we've attempted to make them in our own image, to serve our own needs; they've taken over many of our tasks. They even print messages in our own language, and speak to us in human voices. Something happens between the people and the system, people begin to think of the system as if it were almost human. Psychologists will tell us that this is a common form of transference. It's no wonder people have such strong feelings about computer systems, especially if they have a strong involvement in their implementation. Further, it is the task of psychologists to recognize, interpret and report on this phenomenon.

Alvin Toffler, in his new book "The Third Wave", believes that so far as change is concerned, we are only experiencing the tip of the iceberg; that the rate of change in our work environment, and our attitudes due to the changing pressures and technology will rise exponentially.

Organizations' ability to deal with office automation's impact on the office culture to plan and direct its implementation becomes even more important than the implementation of the technologies per se'. Technocratic approaches to these sensitive areas will prove to be counter productive, remember

Management Information Systems' many disappointments, its not that long ago. It is time to put the system development back into the hands of the user, its the only way it's going to work.

"Bridging methodologies" through "Self-Actualizing Systems" is the answer; how you develop and use them, is the challenge.

PERSPECTIVES

OF

INTERFACING PEOPLE WITH TECHNOLOGY

IN THE

DEVELOPMENT

OF

OFFICE AUTOMATION SYSTEMS

SUBMITTED BY THOMAS R. CONROY, CDC, 1980

THOMAS R. CONROY

PROFILE

Mr. Conroy is the director of Information Exchange Programs, for Control Data Corporation, and is responsible for developing programs to introduce new office automation technologies into the office. These programs are directed at improving productivity and quality of work life of all people who work in the office. He is also responsible for developing new methodologies of introducing office automation and evaluating the quantitative and qualitative results of such technologies.

Mr. Conroy has a systems engineering and business background with extensive experience in designing, developing and installing communications and other computer-based systems.

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